WHAT IS CLAIMED IS:

1. A diagnostic microbiological testing apparatus, comprising:

a carousel assembly adapted to mount a plurality of test panels each having a plurality of wells for receiving a test inoculum fluid for producing a reaction;

a plurality of light sources capable of directing light of predetermined wavelengths toward the wells of the test panels to cause the wells to emit or absorb light based on the reaction of the test inoculum fluid;

a light detection unit disposed opposing said light sources, with at least one test panel being positioned between said light sources and said light detection unit, said light detection unit for detecting the light emitted from, or absorbed by, the wells of the at least one test panel, wherein said carousel assembly rotates continuously during testing to position each of the test panels between said light sources and said light detection unit to permit light emitted from, or absorbed by, the wells of the test panels to be detected by said light detection unit as the test panels move past said light sources; and

a controller adapted to receive a plurality of signals generated by said light detection unit, each signal respectively corresponding to the light detected from each well, said controller for determining a test result for each well based on the received signals.

2. An apparatus according to Claim 1, wherein the inoculum fluid comprises one or more reagents and a microbiological test sample.

3. An apparatus according to Claim 2, wherein the inoculum fluid produces a reaction for providing an identification test result.

4. An apparatus according to Claim 2, wherein the inoculum fluid produces a reaction for providing an antibiotic susceptibility test result.

5. An apparatus according to Claim 1, wherein said light sources are arranged to be proximate to each test panel rotated between said light sources and said light detection unit.

6. An apparatus according to Claim 1, wherein said light detection unit includes a linear CCD array.

7. An apparatus according to Claim 6, further comprising means for spatially averaging an analog linear CCD signal from said linear CCD array so as to eliminate unwanted optical and electrical artifacts from sample column data of said linear CCD array.

8. An apparatus according to Claim 7, wherein said averaging means performs said spatial averaging using partial analog decommutation of pixel intensity of the analog linear CCD signal.

9. An apparatus according to Claim 1, wherein said light detection unit includes a linear CCD array, said light sources are capable of selectably generating monochromatic light and can be selectably energized to produce red, green or blue wavelength light, said carousel assembly is also adapted to mount a normalization panel having a plurality of normalization wells, and the plurality of received signals includes a normalization signal generated by the light detection unit from the light emitted from, or absorbed by, the normalization wells of the normalization panel.

10. An apparatus according to Claim 9, wherein the selectably energized monochromatic light provides linear illumination over a column of wells of the normalization panel or the test panels.

11. An apparatus according to Claim 10, further comprising means for piecewise adjustment along the column of wells in the normalization panel.

12. An apparatus according to Claim 11, further comprising means for illuminating a columns of wells the test panels using an illumination profile, thereby allowing an optical response of each well to be measured with uniform sensitivity for all well locations within each column.

13. An apparatus according to Claim 1, wherein carousel assembly is also adapted to mount a normalization panel having a plurality of normalization wells, and the plurality of received signals includes a normalization signal generated by the light detection unit from the light emitted from, or absorbed by, the normalization wells of the normalization panel.

14. An apparatus according to Claim 13, wherein said controller normalizes the received signals corresponding to the wells of the test panels using the normalization signal.

15. An apparatus according to Claim 1, further comprising a plurality of optical filters, each optical filter disposed between the test panels and said light detection unit for passing therethrough only light emitted from, or absorbed by, the wells having a predetermined bandwidth about a predetermined wavelength.

16. An apparatus according to Claim 1, wherein said lights sources include a first light source capable of selectably generating monochromatic light and a second light source capable of generating UV light.

17. An apparatus according to Claim 16, wherein said first light source comprises a plurality of red LEDs, a plurality of green LEDs and a plurality of blue LEDs, and each of said plurality of LEDs being selectably energized.

18. An apparatus according to Claim 16, wherein said first light source comprises a plurality of LEDs arranged in a predetermined manner.

19. An apparatus according to Claim 18, wherein said plurality of LEDs are arranged in a column having a top and a bottom end, and wherein the LEDs are spaced closer together at the top and the bottom ends as compared to the LEDs at a center portion of said column.

20. An apparatus according to Claim 1, wherein said light detection unit includes a linear detector array.

21. An apparatus according to Claim 1, wherein at least one of said light sources is capable of selectably generating light sufficient to produce an emission fluorescence of the test inoculum fluid.

22. An apparatus according to Claim 21, where said light source comprises a UV cold-cathode lamp or a UV hot-cathode lamp.

23. An apparatus according to Claim 1, wherein each received signal corresponds to a numerical value

indicating the intensity of the light detected from each respective well.

24. An apparatus according to Claim 1, further comprising a barcode reader disposed proximately to the test panels for reading barcode labels respectively affixed to the test panels.

25. An apparatus according to Claim 1, wherein said control processor determines the test results using colorimetric or fluorometric received signals, or both.

26. An apparatus according to Claim 1, further comprising an incubation unit for heating said test panels.

27. An apparatus according to Claim 1, further comprising an enclosure surrounding said carousel assembly for preventing detection of ambient light by said light detection unit.

28. An apparatus according to Claim 1, wherein said carousel assembly further comprises a carrier adapted to receive and carry the test panels.

29. An apparatus according to Claim 1, wherein the wells of a test panel are arranged in rows and columns, and wherein said light sources direct light toward one of the columns of wells.

30. An apparatus according to Claim 6, wherein the wells of a test panel are arranged in rows and columns, and wherein said linear CCD array is positioned to detect light from a column of wells over a predetermined number of scans, said linear CCD array detecting a portion of light of the column of wells on each scan.

31. An apparatus according to Claim 1, wherein said carousel assembly further comprises a stepper motor unit for rotating said carousel assembly.

32. An apparatus according to Claim 30, wherein said carousel assembly further comprises a stepper motor unit for rotating said carousel assembly, and said stepper motor causes said carousel assembly to rotate continuously during testing.

33. An apparatus according to Claim 1, wherein the test panels are capable of being mounted on said carousel assembly in multiple tiers.

34. A diagnostic microbiological testing system, comprising:

a diagnostic microbiological testing apparatus according to Claim 1;

a station for inoculating the test panels with the test inoculum fluid;

a computer workstation comprising:

a CPU for additionally processing the test result output from the diagnostic microbiological testing apparatus to the computer workstation; and

a memory for selectively storing the test result from the diagnostic microbiological testing apparatus and the additionally processed test result.

35. A incubation chamber for a diagnostic microbiological testing apparatus, said chamber comprising:

a carousel assembly adapted to mount a plurality of test panels each having a plurality of wells for receiving a test inoculum fluid for producing a reaction;

an enclosure surrounding said carousel assembly for preventing intrusion of ambient light into said

incubation chamber, said enclosure having a door for providing access to said carousel assembly;

a drive system for continuously rotating said carousel assembly to directly position the test panels for testing by said diagnostic microbiological testing apparatus;

a heating unit for heating said incubation chamber; and

a temperature controller for controlling said heating unit to maintain the temperature of said incubation chamber within a predetermined temperature range.

36. A chamber according to Claim 35, wherein said carousel assembly further comprises a carrier adapted to receive and carry the test panels.

37. A chamber according to Claim 35, further comprising means for permitting said diagnostic microbiological testing apparatus to determine a predetermined position of the carousel assembly.

38. A carrier for a diagnostic microbiological testing apparatus having a carousel assembly, said carrier comprising:

a frame adapted to receive and carry a test panel having a plurality of wells for receiving a test inoculum fluid for producing a reaction, said frame receiving the test panel so as to position the test panel in a predetermined manner;

means for mounting said frame onto said carousel assembly;

electrical connecting means for electrically connecting said carrier to said carousel assembly; and

an LED mounted on said frame and electrically connected to said electrical connecting means, said LED

capable of being selectively activated by said diagnostic microbiological testing apparatus.

39. A carrier according to Claim 38, wherein said LED indicates a completion of testing by said diagnostic microbiological testing apparatus.

40. A carrier according to Claim 38, further comprising means for permitting said diagnostic microbiological testing apparatus to determining the leading edge of the test panel received therein.

41. A diagnostic microbiological testing apparatus, comprising:

a carousel assembly adapted to mount a plurality of test panels each having a plurality of wells for receiving a test inoculum fluid for producing a reaction;

at least one light source capable of directing light of a predetermined wavelength toward the wells of the test panels to cause the wells to reflect or absorb light based on the reaction of the test inoculum fluid;

a light detection unit disposed at a reflection angle to said light source, with at least one test panel being positioned opposing said light source and said light detection unit in a reflective manner, said light detection unit for detecting the light reflected from, or absorbed by, the wells of the at least one panel, wherein said carousel assembly rotates continuously during testing to position each of the test panels to permit light reflected from, or absorbed by, the wells of the test panels to be detected by said light detection unit as the test panels move past said light source; and

a controller adapted to received a plurality of signals generated by said light detection unit, each signal respectively corresponding to the light detected

from each well, said controller for determining a test result for each well based on the received signals.

42. A method of operating a diagnostic microbiological testing apparatus, comprising the steps of:

continuously rotating a carousel of the testing apparatus to position a test panel between a light source and a light detection unit of the testing apparatus, the test panel including a plurality of wells for receiving a inoculum fluid comprising a reagent and a microbiological test sample for producing a test reaction and being mounted on the carousel;

directing light from the light source toward the at least one test panel;

detecting with the light detection unit the light emitted from, or absorbed by, each of the wells of the at least one test panel due to the test reaction;

generating with the light detection unit a signal corresponding to the light detected from each of the wells; and

determining a test result for each of the wells based on the generated signal.

43. A method of performing diagnostic microbiological testing, comprising the steps of:

inoculating a plurality of test panels including a plurality of wells for receiving a inoculum fluid comprising a reagent and a microbiological test sample for producing a test reaction;

mounting the test panels on a carousel of a diagnostic microbiological testing apparatus; and

operating the testing apparatus to cause (1) the carousel to rotate continuously to position at least one test panel between a light source and a light detection unit of the testing apparatus, (2) a light from the light source to be directed toward the at least one test panel, (3) the light emitted from, or

absorbed by, each of the wells of the at least one test panel due to the test reaction to be detected by the light detection unit, (4) a signal corresponding to the light detected from each of the wells to be generated by the light detection unit, and (5) a test result to be determined for each of the wells based on the generated signal.

44. A computer readable medium on which are stored instructions, which upon execution will operate a diagnostic microbiological testing apparatus, the instructions comprising:

instructions for continuously rotating a carousel of the testing apparatus to position at least one test panel between a light source and a light detection unit of the testing apparatus, the test panel including a plurality of wells for receiving a inoculum fluid comprising a reagent and a microbiological test sample for producing a test reaction and being mounted on the carousel;

instructions for activating light from the light source to illuminate the at least one test panel;

instructions for detecting with the light detection unit the light emitted from, or absorbed by, each of the wells of the at least one test panel due to the test reaction;

instructions for generating with the light detection unit a signal corresponding to the light detected from each of the wells; and

instructions for determining a test result for each of the wells based on the generated signal.

45. A computer readable medium on which are stored instructions, which upon execution will operate a diagnostic microbiological testing apparatus, the instructions comprising:

instructions for controlling the rotation speed of a carousel of the testing apparatus to move continuously at least one test panel and at least one normalizer panel past a light source and a light detection unit of the testing apparatus at a predetermined angular velocity, the test panel including a plurality of wells for receiving a inoculum fluid comprising a reagent and a microbiological test sample for producing a test reaction and being mounted on the carousel, the normalizer panel including a plurality of normalization wells;

instructions for detecting with the light detection unit the light emitted from, or absorbed by, each of the normalization wells of the at least one normalizer panel;

instructions for normalizing the light emitted from, or absorbed by, each of the wells of the at least one test panel due to the test reaction and detected with the light detection unit;

instructions for generating with the light detection unit a signal corresponding to the normalized light from each of the wells; and

instructions for determining a test result for each of the wells based on the generated signal.

46. A computer readable medium according to Claim 45, the instructions further comprising:

instructions for monitoring a light intensity of light from the light source directed toward the at least one test panel; and

instructions for taking corrective action if the light intensity is outside a predetermined range.

47. An apparatus, comprising:

a light source capable of producing a composite light signal having light elements of variable intensity; and

a controller adapted to control said light source using an illumination profile.

48. An apparatus according to Claim 47, further comprising:

a light detection unit; and

an optics system capable of directing the composite light signal toward said light detection unit.

49. An apparatus according to Claim 48, wherein the illumination profile corrects optical inefficiency in said optics system.

50. An apparatus according to Claim 47, wherein said light source comprises a plurality of LEDs being arranged as a linear array.

51. An apparatus according to Claim 47, further comprising a sensor electrically connected to said controller, wherein said sensor monitors the composite light signal, and said controller controls said light source in response to a signal from said sensor.

52. An apparatus according to Claim 47, further comprising feedback means for providing feedback to said controller, wherein said controller compensates for undesired changes in the composite light signal by selecting one of a plurality of illumination profiles.

53. A light source comprising:

a plurality of LEDs being arranged in a linear array, junction current of each LED being controllable to produce a predetermined illumination profile.

54. A light source comprising:

a plurality of LEDs being arranged in a linear array having two ends, each end having a group of LEDs of said plurality of LEDs, each said group of LEDs being geometrically compressed.

55. A light source according to Claim 54, wherein the LEDs comprise red, green and blue LEDs arranged in a predetermined order in the linear array.

56. An optics system including a test panel having a plurality of wells, each well for receiving a test inoculum fluid, said system comprising:

a visible light source capable of producing light of different wavelengths;

a diffuser positioned between said visible light source and the test panel;

an UV light source;

an excitation filter positioned between said UV light source and the test panel,

wherein the light and the UV light cause the wells to emit or absorb light based on a test reaction of the test inoculum fluid;

an emission filter positioned between the test panel and an objective lens to filter out the UV light from the light emitted from, or absorbed by, the wells; and

said objective lens positioned between said emission filter and a detector, said objective lens focusing the filtered, emitted or absorbed light onto said detector.